

PATENT SPECIFICATION



Application Date: Nov. 6, 1924. No. 26,474/24.

245,551.

Complete Left: Aug. 5, 1925.

Complete Accepted: Jan. 14, 1926.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Valves for Venting Air from Water Mains and the like.

We, **GERALD THORNHILL EDWARDS**, of 32, Westleigh Road, Leicester, and **ROBERT ARNOLD BLAKEBOROUGH**, of Woodhouse Works, Brighouse, both British subjects, do hereby declare the nature of this invention to be as follows:—

The invention has reference to valves for removing automatically accumulations of air from water mains and the like, and has for its object to provide means for the purpose which will function with greater reliability than the valves hitherto employed and which will present the additional advantage of functioning as a shock absorber and thereby of preventing damage through sudden rise of pressure in the main.

A device according to the invention is characterised in that a container, slidable with relation to a valve stopper adapted to seal an opening in the upper part of the container, is open to the main and is normally held by the contained weight of water in a position to maintain closed the outlet referred to. When by accumulation of air within the container, and consequent displacement of water therefrom, the weight of the container and its contents falls below a certain amount, the container moves relatively to the valve stopper and permits of the discharge of the accumulated air, the entrance of water into the container to replace the air discharged gradually increasing its weight and, at the appropriate time, causing it to seal the air discharge outlet.

The discharging movement of the container may be effected by balance weights, or by the pressure of the water in the main, or by both agencies combined.

[Price 1/-]

In the preferred embodiment of the invention, the container is in the form of a cylindrical vessel supported at its ends, and free to rock, upon hollow trunnions through which the interior of the vessel is connected with the main. The vessel is counterbalanced by adjustable weights, which are conveniently carried on a lever arm secured to a facing on one side of the vessel. Extending up through the vessel is a cylinder or hollow stem within which works an equilibrium piston valve provided at its upper end with a seating ring adapted to contact with a seat surrounding an outlet opening in the top of the vessel. Suitable ports in the upper end of the cylinder place the interior of the vessel into communication with the atmosphere when the discharge valve is open. The discharge valve is carried by a link extending down through the open lower end of the cylinder and mounted at its lower end on a fixed pivot, conveniently carried by a bracket attached to or forming part of the inlet pipe which connects the vessel to the main.

Normally the weight of water in the vessel, added to the rocking weight of the vessel itself, overcomes the action of the balance weights and causes the container to tilt to a position in which the air discharge opening is held closed. As air accumulates inside the vessel, it gradually drives out water until the balance weights can act to rock or tilt the vessel to open up the discharge outlet. The consequent entry of water into the vessel adds to its weight which eventually becomes great enough to overcome the balance weights, whereupon the discharge opening is closed again, the action continuing automatically so long as air continues to enter the vessel. It will

be observed that in this construction the action of the valve is quite independent of the pressure in the main.

In an alternative embodiment, the container or vessel is slidable vertically with relation to a fixed inlet pipe in communication with the main, suitable ports being provided in the pipe to admit water and air to the vessel. The upper end of the vessel has an axial opening which, in the lower position of the container, is adapted to seat itself upon a valve member carried by the inlet pipe and which, when the vessel is raised, opens up the interior of the vessel to atmosphere.

The area of the outlet opening at the top of the vessel is suitably less than that of the inlet pipe upon which the bottom of the vessel slides, so that the pressure of accumulated air inside the vessel, acting upon the unbalanced area, will raise the vessel and permit of escape of air until the weight of water in the container reaches a certain amount sufficient to overcome the unbalanced pressure, whereupon the vessel descends and closes the outlet opening.

A lever, suitably pivoted between its ends and disposed beneath the vessel may have one arm provided with adjustable weights and be adapted to bear with its

other arm against the underside of the vessel, thus enabling the weight of water necessary or effective to close the air outlet to be adjusted. 35

Suitable means are preferably provided to limit the upward movement of the container such for instance as a stop plate or disc carried by a vertical extension of the inlet pipe. 40

The containing vessel, in either embodiment of the invention, may be of relatively large capacity so that the accumulated air within it will act as a cushion to absorb sudden rises of pressure in the main which might otherwise cause damage. 45

The details of construction of the device, according to either of the embodiments referred to, may be varied. 50

The parts are, of course, so arranged and proportioned that the air outlet is always closed before the air contents of the vessel have been completely discharged, in order to guard against possible discharge of water through such outlet. 55

Dated the 5th day of November, 1924.

BARRON & LEWIN,
Station Street Buildings, Huddersfield, 60
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Valves for Venting Air from Water Mains and the like.

We, GERALD THORNHILL EDWARDS, of 32, Westleigh Road, Leicester, and ROBERT ARNOLD BLAKEBOROUGH, of 65 Woodhouse Works, Brighouse, both British subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention has reference to valves for removing automatically accumulations of air from water mains and the like, and has for its object to provide means for the purpose which will function with greater reliability than the valves hitherto employed and which will present the additional advantage of functioning as a shock absorber and thereby of preventing damage through sudden rise of pressure in the main.

A device is known in which a container, mounted to rotate about a fixed pivot and counterbalanced by a weight, has its lower part connected by a flexible connection to the main and has leading

from its upper part a pipe, the open end of which is adapted to be held against a fixed seating when the container is filled with water but which is removed from the seating to permit of escape of air when, owing to accumulation of air within the container, the balance weight is able to overcome the pivotal weight of the container and its contents. 90 95

A device according to the present invention is characterised in that a container open to the main has an outlet passage in its upper end leading to the atmosphere and controlled by a vertical piston or equivalent valve, the container being slidable in relation to such valve to cause the outlet to be closed when the container is filled to a predetermined point with water and to be opened when through accumulation of air a determined quantity of water has been expelled from the container. 100 105

The discharging movement of the container may be effected by balance weights, or by the pressure of the water 110

in the main, or by both agencies combined.

In the accompanying drawings, to which reference will hereafter be made:—

5 Fig. 1 is a transverse section of one form of the invention, in which the container has rocking movements;

10 Fig. 2 is an elevation, partly in section, looking in the direction of the arrow A, Fig. 1;

15 Fig. 3 is a similar view to Fig. 1 of a construction on the general lines of Fig. 1, but having the trunnions and discharge valve somewhat differently arranged;

Fig. 4 is an elevation, partly in section, looking in the direction of the arrow B, Fig. 3; and

20 Fig. 5 is a sectional elevation of an alternative form of construction in which the container has vertical sliding movements instead of rocking movements as in the constructions illustrated in the preceding figures.

25 Referring firstly to Figs. 1 and 2, a container 1, in the form of a cylindrical vessel, is supported at its ends, and is free to rock, upon hollow trunnions 2, 2, through which the interior of the vessel 1 is connected with an inlet 3, which is in communication with the main. The vessel 1 is counterbalanced by adjustable weights 4, carried on a rod 5 depending from a lever arm 6, which is secured to a facing on the appropriate side of the vessel. Extending up through the vessel is a cylinder or hollow stem 1¹ within which works an equilibrium piston valve 7 provided at its upper end with a seating ring 8 adapted to contact with a seat surrounding an outlet opening 9 in the top of the vessel. Ports 1² in the upper end of the cylinder 1¹ place the interior of the vessel into communication with the atmosphere when the discharge valve 7 is open. The discharge valve is carried by the upper end of a link 10, extending down through the open lower end of the cylinder and mounted at its lower end on a fixed pivot 11 carried by a bracket 3¹ forming part of, or attached to, the inlet pipe 3 which connects the vessel to the main.

55 Normally, the weight of water in the vessel, added to the rocking weight of the vessel itself, overcomes the action of the balance weights 4 and causes the vessel to tilt to a position, as shewn in Fig. 1, in which the air discharge opening 9 is held closed, the water level in the vessel at this time being approximately indicated at L. As air rises from the main and accumulates inside the vessel, it gradually drives out water until 65 the balance weights can act to rock or

tilt the vessel upwardly and thus open up the discharge outlet which may occur when the water has been displaced say down to the level L¹. The consequent entry of water into the vessel now adds to its weight, which eventually becomes great enough to overcome the balance weights, whereupon the discharge opening is closed again, the action continuing automatically so long as air continues to enter the vessel, and being quite independent of the pressure in the main.

In the arrangement shewn in Figs. 3 and 4 the cylinder 1¹ in which the discharge valve 7 slides, instead of being placed inside the vessel as in Figs. 1 and 2, is placed to one side of the vessel and an opening 1³ in the upper part of the vessel communicates with an opening 1⁴ in the cylinder wall. Similarly, the trunnions on which the vessel is mounted, instead of opening directly into the ends of the vessel, are disposed to one side of the vessel and open into passages such as 1⁵ formed in angular extensions 1⁶ on the ends of the vessel. The action of this arrangement is identical with that of the one previously described.

In the arrangement of Figs. 1 and 2 the cylinder 1¹ instead of being inside the vessel, might be placed outside same and secured to a facing on the left hand side of the vessel as seen in Fig. 1, an opening in the upper part of the vessel communicating with an opening in the cylinder wall as in Fig. 3. The bracket 3¹, supporting the lower end of the link 10, would in this case be appropriately lengthened.

105 Referring now to Fig. 5, the vessel 1 is, in this instance arranged to be slidable vertically with relation to a fixed inlet pipe 12 having its lower end in communication with the main, suitable ports 12¹ being provided in said pipe to admit water and air to the vessel. The discharge opening 9 is, in this instance, arranged axially in the upper end of the vessel and is provided with a seating ring 9¹ which, in the lower position of the container or vessel is adapted to seat itself, as shewn in the drawing, upon a ring or valve member 13 carried by a vertical extension 12² of the inlet pipe 12. When the vessel is raised, its interior is opened up to atmosphere through the opening 9, as will be understood.

The area of the opening 9 is preferably suitably less than that of the inlet pipe 12 upon which the bottom of the vessel slides, so that the pressure of accumulated air in the vessel, acting upon the unbalanced area, will tend to raise the vessel and permit of escape of 130

air until the weight of water in the container reaches a certain amount sufficient to overcome the unbalanced pressure, whereupon the vessel will descend and close the outlet opening. A lever 14, suitably pivoted at 15, may have one arm provided with adjustable weights 16 and be adapted to bear, as shewn, with its other arm against the underside of the vessel, thus enabling the weight of water, necessary or effective to close the outlet 9, to be adjusted.

Suitable means, such as a hood or cover 17 carried by a rod 18 extending up from the extension 12³ of the pipe 12, serve to limit the upward movement of the vessel 1.

The vessel 1, in either form of construction, may be of relatively large capacity, so that the accumulated air within it will act as a cushion to absorb sudden rises of pressure in the main which might otherwise cause damage.

The details of construction and arrangement of the device may be varied otherwise than as above mentioned. The parts are, of course, in any form of embodiment, so arranged and proportioned that the air outlet is always closed before the air contents of the vessel have been completely discharged, in order to guard

against possible discharge of water through such outlet.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A device for the purpose specified characterised in that a container open to the main has an outlet passage in its upper end leading to the atmosphere and controlled by a vertical piston or equivalent valve, the container being slidable in relation to such valve to cause the outlet to be closed when the container is filled to a predetermined point with water, and to be opened when through accumulation of air a determined quantity of water has been expelled from the container.

2. A valve, as claimed in Claim 1, having a constructional form, and operating, substantially as herein described with reference to, and as illustrated by, any of the figures of the accompanying drawings.

Dated the 4th day of August, 1925.

BARRON & LEWIN,
Station Street Buildings, Huddersfield,
Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

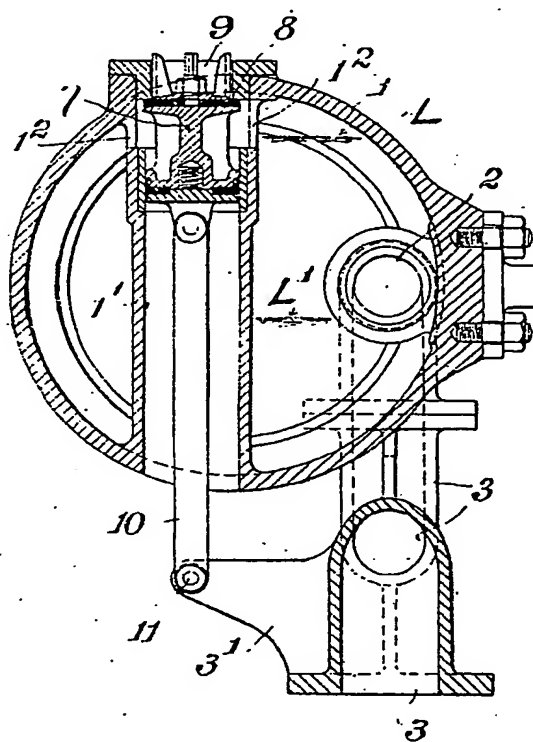


Fig. 1.

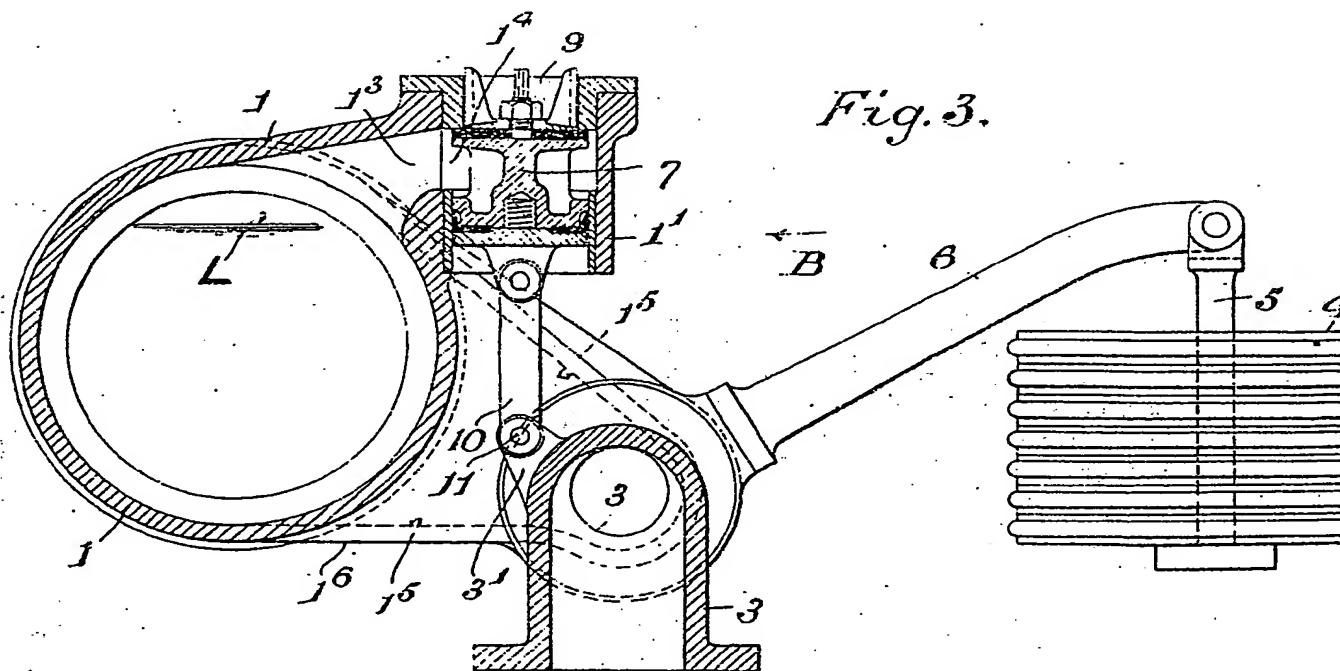


Fig. 3.

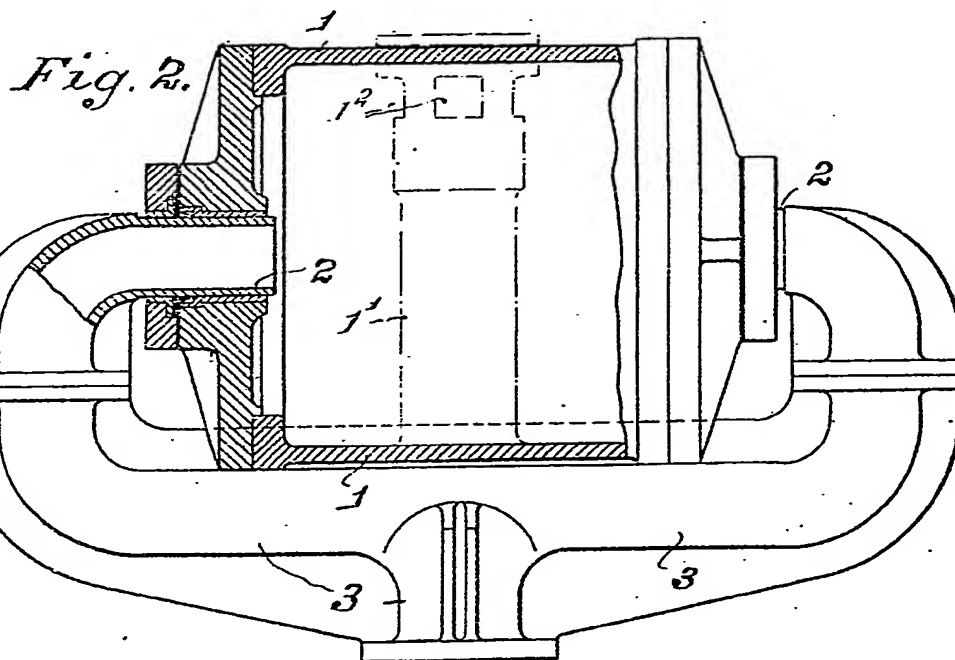
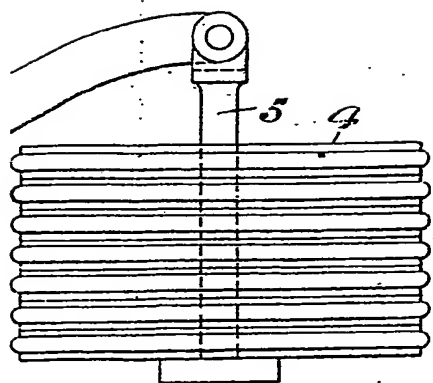
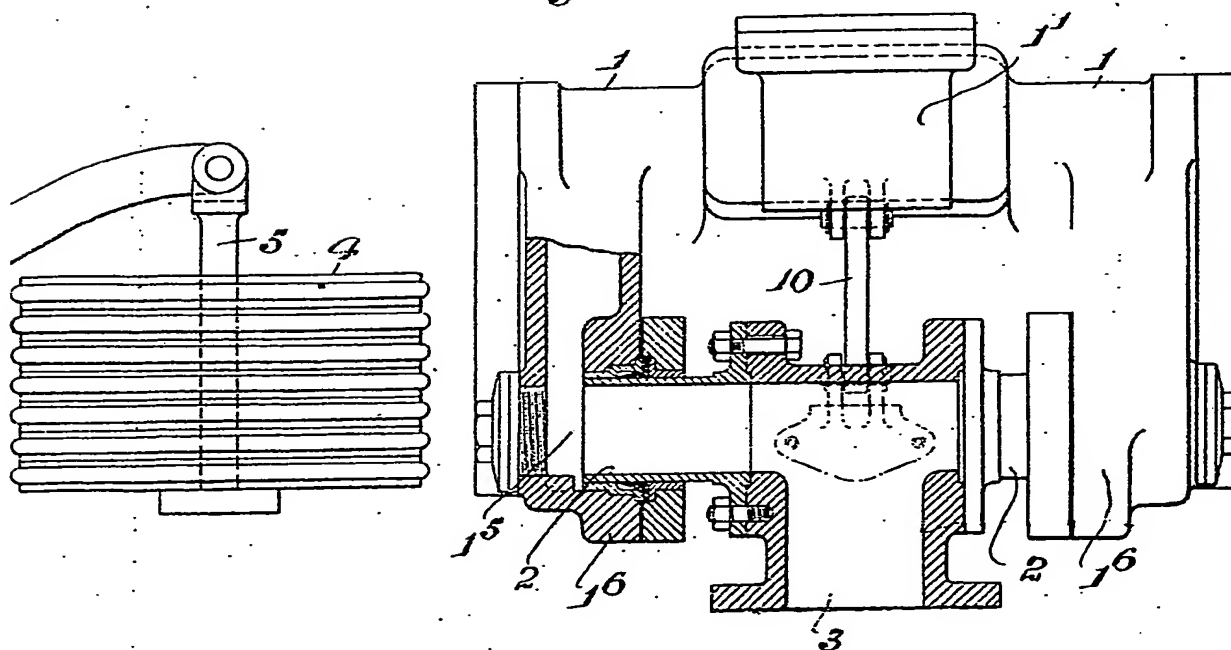
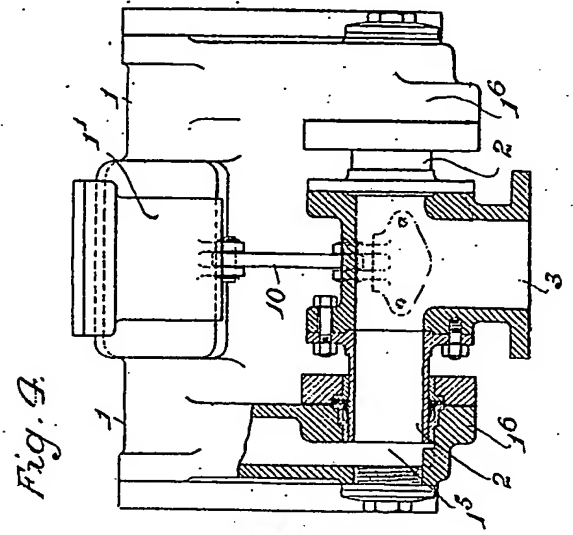
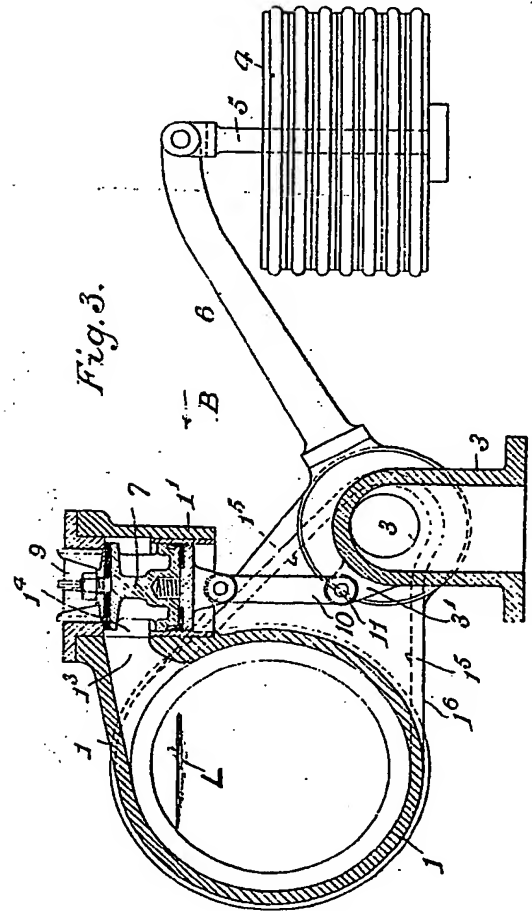
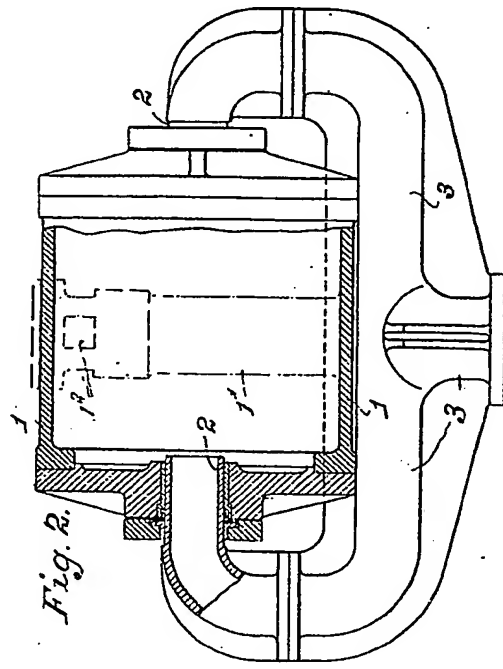
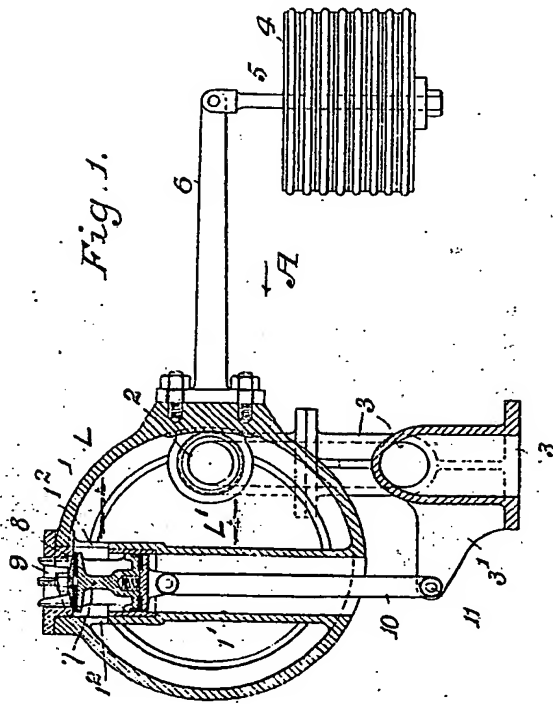


Fig. 4.



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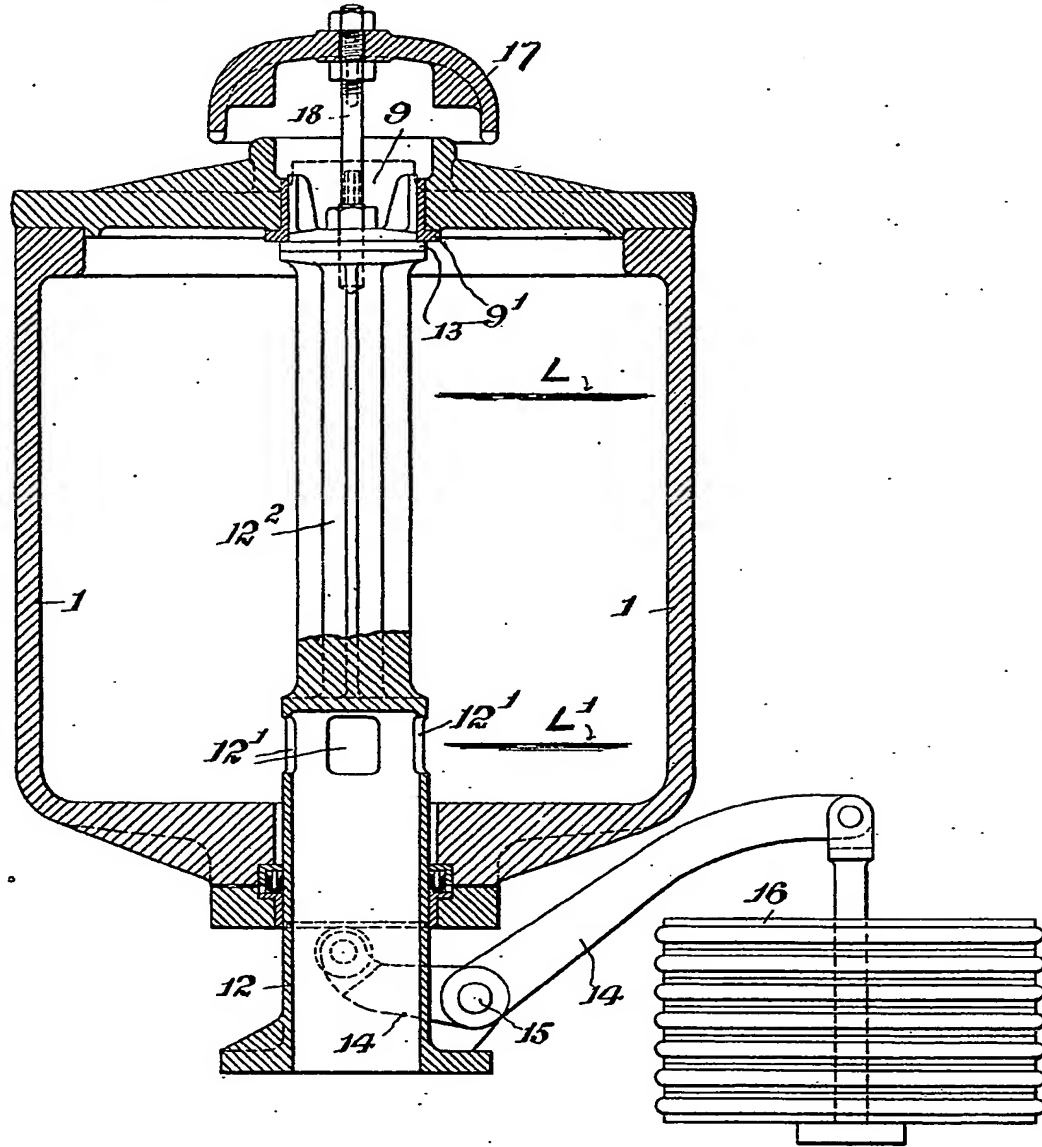
2 SHEETS
SHEET 1



[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 5.

[This Drawing is a reproduction of the Original on a reduced scale.]



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